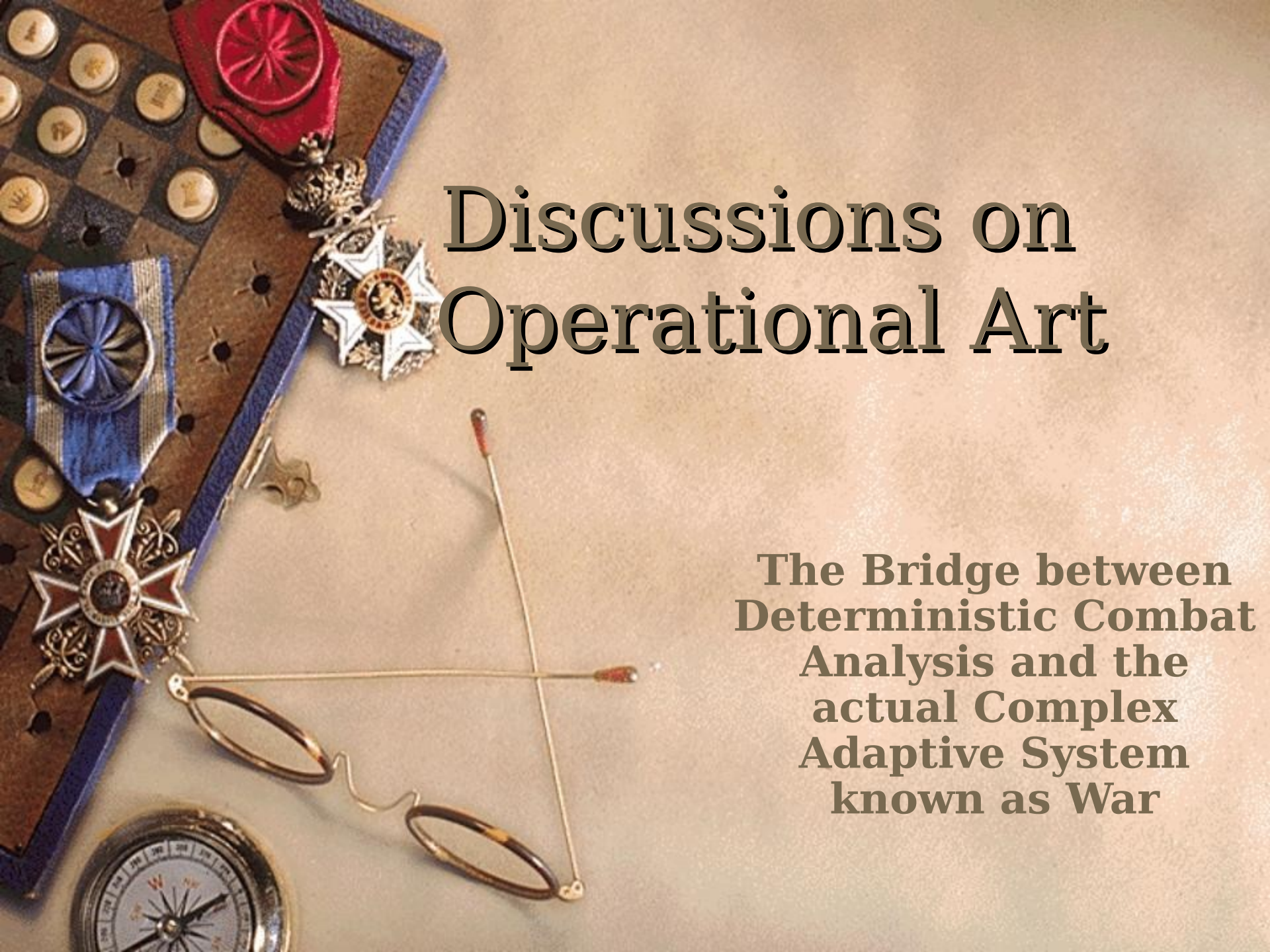

Discussions on Operational Art

The Bridge between Deterministic Combat Analysis and the actual Complex Adaptive System known as War

Referencing Combat Planning Models: Sun-Tzu

Sun-Tzu's calculations:

- **"As for military methods: the first is termed measurement: the second estimation [of forces]; the third, calculation [of numbers of men]; the fourth, weighing [relative strength]; and the fifth, victory.**
- **"Terrain gives birth to measurement; measurement produces the estimation [of forces]. Estimation [of forces] gives rise calculating [the numbers of men]. Calculating [the numbers of men] gives rise to weighing [relative strength]. Weighing [strength] gives birth to victory."**

Kline's Read:

Distance + Force Structure + Logistics Capability + Time = Combat Potential at objective

Combat Potential vs Enemy Combat potential comparison at objective generates courses of

Sun-Tzu's further Models

Sun-Tzu's strategy after calculations:

- **"In general, the strategy for employing the military is this: If your strength is ten times theirs, surround them; if five, then attack them; if double, then divide your forces."**

  Where do you think he came up with this rule?

  Have we similar rules of thumb? Where did we come up with them?

Some Historical Examples of Combat Planning Models

- Sun-Tzu, Clausewitz, Jomini, and other classical writers discuss numbers in warfare from their strategic writings.
- Likewise, Lanchester and Hughes (and many others) created equations to describe attrition and naval warfare respectively.
- Next slide highlights examples used in warfare planning or execution.

Some Historical Examples of Analysis in Warfare

- *Admiral Doenitz "Battle of Atlantic" winning criteria: 600K – 800K tonnage sunk*
  - *Analytical Derivation*
- *War Plan Orange*
  - *Wargaming*
- *Battle of Atlantic (Birth of Ops Research)*
  - *Search Theory*
- *Battle of Bismark Sea (WWII)*
  - *Game Theory*
- *Vietnam "Body Count"*
  - *Measure of Effectiveness Gone Bad?*
- *Vietnam Air-to-Air Combat Analysis*
  - *Data Analysis*
- *Gulf War, Kosovo, and OIF Effects of Strikes*
  - *Network Analysis and Scheduling*
- *Current OPLANS?*

Warfare Analysis: Tidy Statements about Untidy Phenomena

- **SO many estimates and assumptions**:
  - *Weapon accuracy and effectiveness*
  - *Sensor effectiveness*
  - *Aircraft availability, load capacity, turn-around times, range*
  - *Enemy Capabilities*
- **Then we build "Transparent" and artificially neat models in an attempt to:**
  - *Show a clear cause and effect*
  - *By well defined inputs that cover all the vital variables!*
- **NOT an engineering approach**!
  - *Messy problems, "dirty data", complex activities, multiple courses of action for both sides, unclear results*
  - *Best: Hope to derive gross-level patterns and identify what is important*

DOES NOT PREDICT OUTCOMES!

Models

- White Papers: Logical and based on analytical computations
- Mathematical Statements and Applied Math:
  - Optimization
  - Search Equations
  - Statistics and Probabil
  - Data Analysis
- "Closed" Simulation
- War Game ("Manned" Simulation)
- Field Experiments

Each has strengths and weaknesses depending on the problem!

Input s + ***Mode ls*** → Proces s → Resul ts

“Bottom Line” of Warfare Analy

Does it aid the Decision Maker?

Does it help quantify risk?

But Clausewitz says:

"…Absolute, so-called mathematical factors never find a firm basis in military calculations…In the whole range of human activities, war most closely resembles a game of cards…the art of war deals with living and with moral forces. Consequently, it cannot attain the absolute, or certainty; it must always leave a margin for uncertainty, in the greatest things as much as in the smallest."

On War, p. 86

Or…War is Complex, Adaptive, and a System…

Complex Adaptive Systems (CAS) defined

“consisting of many nonlinearly interacting elements which can adapt their dynamical behavio influences…” ***Heinz Georg Schuster***

“A CAS behaves/evolves according to three key pr order is emergent as opposed to predetermined, the system's history is irreversible, and the system's future is often unpredictable…” ***Kevin Dooley***

And Actual War is:

A Human endeavor involving:

opposing wills with varying and changing objectives at various interacting strategic, operational, and tactical levels;

using dependent and inclusive mechanical, technical, human and environmental systems;

and whose “state” is temporally dependent.

Or…War is Complex, Adaptive, and a System…

So, how do use the Complex Adaptive System concept of War?

"Instead of planning an action in advance we specify constraints and then allow the local conditions at the time to determine how the task will be done.
This is the essence of distributed systems, each **task responds to the local environment in real time,** the interactions between the system and environment **allow an emergent solution to arise. Power is localized,** not concentrated and this **allows fast responses** to unforeseeable events, a **flexibility** that removes the rework costs inherent in more static plans. This is a open, **parallel mode of operation**, where multiple options can be tried simultaneously, compared to the closed, serial mode of conventional management where decisions

Chris Lucas

Sounds like a Conflict Here!

"Oh so 20th-Century" Combat An

VS

The "New Science" Concept of War as a Complex Adaptive System

Na….What is required is a little Operational

After a break?

Operational Art

“The employment of military forces to attain strategic and/or operational objective through the design, organization, integration, and conduct of theater strategies, campaigns, major operations, and decisive battle. Operational art translates combatant strategy and theater design into operational design and ultimately, tactical action by integrating the key activities of all levels of war within a theater. “

Joint Pub 3-02

Elements of Operational Art

Synergy, simultaneity and depth, anticipation, balance,

leverage, timing and tempo, operational reach and approach,

forces and functions, arranging operations, centers of gravity,

Direct vs. indirect approach, decisive points, culmination, and

finally,…… termination.

Joint Pub 3-0

OR…….

The Commander uses Operational Art to *"shape initial conditions"* (or adjust conditions during execution) to create an environment that allows the "*emergent behavior*" of the nation's strategic, operational, and/or tactical goals from the complex adaptive system of opposing system of systems known as war.

The Commander uses all the elements of Operational art to establish the desirable conditions before, during, and after combat.

Nice Concept:

But just how the heck do we ID the right “initial conditions” during our planning process?

Recall from Warfare Analysis Slides:

- **we build "Transparent" and artificially neat models in an attempt to:**
  - *Show a clear cause and effect*
  - *By well defined inputs that cover all the vital variables!*
- **NOT an engineering approach**!
  - *Messy problems, "dirty data", complex activities, multiple courses of action for both sides, unclear results*
  - ***Best: Hope to derive gross-level patterns and identify what is important.***

We use "oh so 20th Century Warfare Analysis" to help define IMPORTANT "initial conditions".

Are the always the "right" ones?
No: or else war would be predictable and not a

A Picture

Shore of:
Joint Planning Process
Warfare Analysis
Commander's Estimates
Technical Rational Thought

Bridge of
Operational
Art
Setting Conditions

River of Reality

Shore of War:
Complex, Adaptive, and Systems of Opposing Syst

An Example

Can we *leverage* superior information systems an
air/maritime capabilities to apply distributed grou
at *decisive points* through out the ground battle s
a command structure and rules of engagement st
allowing *local* initiative to realize:

Accelerated Cumulative Warfare!

Accelerated Cumulative Warfare

Cumulative Warfare + Rapid Execution enabled
Information dominance, precision weapons, dom
Maneuver and focused logistics

"I now think that the information-management revolution has probably made cumulative strategies more readily subject to analysis in planning before events, in carrying out those plans, and in the retrospective analysis of what has already taken place."

Military Strategy: Wy

Special Ops Strategies? Is it possible?

And the Finish:

We recognize the Complex Adaptive Systems nature of war with its non-linear, unpredictable, dynamic, interactive nature and sensitivity to conditions…

We use Warfare Analysis to help identify important conditions to set to increase expectations of obtaining a desired objective…

We use Operational Art to Set those Conditions…